



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/600,546	07/12/2000	CLAUDE CHAPPERT	15675.P322	7116

7590 11/26/2001

BLAKELY SOKOLOFF TAYLOR & ZAFMAN  
12400 WILSHIRE BOULEVARD  
7TH FLOOR  
LOS ANGELES, CA 90025

EXAMINER

ANGEBRANNDT, MARTIN J

ART UNIT	PAPER NUMBER
----------	--------------

1756

DATE MAILED: 11/26/2001

4

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/600,546

Applicant(s)

CHAPPERT ET AL.

Examiner

Martin J Angebrannt

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on 18 September 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

Art Unit: 1756

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, it is not clear from the language "...light ions, such as He<sup>+</sup> ions, ..." if the claim is limited to helium ions or embraces other light ions.

Claim 1 should clearly indicate that the material is multilayer material composed of thin layers.

It is not clear from the language "in one or more regions having sizes of the order of 1 micrometer or less are irradiated" if it embraces non-selective (i.e. flood, unmasked) irradiation of the entire surface as long as the surface is one micron in size or larger, successive irradiation of areas 1 micrometer or less in size to include the entire surface and/or selective radiation on only certain areas of the surface being 1 micrometer or less in size and leaving other areas unirradiated.

In claim 3, the language "especially for the production of discrete magnetic materials, of magnetic memory circuits or of magnetically-controllable logic circuits, ..." renders the claim unclear as it is not clear if the scope of the claim is limited to these species or is broader in scope.

Claim 5 refers to itself and later introduced claim 6 and none of the terms referred to have antecedent basis.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Art Unit: 1756

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 1 is rejected under 35 U.S.C. 102(b) as being fully anticipated by Steckl et al.

“Review of Focused ion beam mixing for the fabrication of GaAs based optoelectronic devices”,

J. Vac. Sci. Technol. B, Vol 13(6) pp 2570-2575 (11/12-1995)

The use of a  $\text{Si}^{2+}$  (28.09 AU) focused ion beam (FIB) with an energy of 100 or 200 Kev and a dosage of  $10^{14}$  ions/cm<sup>2</sup> to form the mixed region shown in figure 1 is disclosed in the left hand column of page 2571. The use of resists or masks with wider beams is disclosed in the introduction section.

For the purposes of the claim the terms “on the order of or less than a hundred keV is held to embrace any value less than several hundred keV as “the order of” refers to the order of magnitude. The phrase on the order of 1 micrometer is treated similarly. The scope of the claim has been treated to embrace light ions of less than 100 AU based upon the disclosure on page 9 at line 15-16 defining “heavy ions” as those having a mass on the order of 100 [AU] and the direction to the use of Kr<sup>+</sup> ions on page 9 at lines 27-32.

Art Unit: 1756

6. Claims 1 and 3-5 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Jung et al. "Atomic Transport by Ion Beam Mixing in the Radiation Enhanced Diffusion Region", Mat. Res. Soc. Symp. Proc. Vol. 354 pp. 21-26 (1995)

The use of 80 keV  $\text{Ar}^+$  (39.95 AU) **ion beam** to cause mixing in PD/Co multilayers at dosages of  $1.5 \times 10^{16} \text{ Ar}^+/\text{cm}^2$  is disclosed.

The examiner assumes that this beam is somewhat focused.

7. Claim 1 is rejected under 35 U.S.C. 102(b) as being fully anticipated by Kanayama et al., "Fine Pattern Definition with Atomic Intermixing Induced by Focused Ion Beam and Its Application to X-ray Mask Fabrication", J. Vac Sci. Technol. B, Vol 9(2) pp. 296-301 (4/1991).

The use of focused ion beams of 300 keV  $\text{Kr}^+$  (39.95 AU) at a dosage of  $5 \times 10^{15} \text{ ion/cm}^2$  to mix aluminum and gold layers is disclosed in section B. Similar results are disclosed for a 50 keV  $\text{Ga}^+$  (69.72 AU) beam at dosages of  $2-5.8 \times 10^{15} \text{ ion/cm}^2$  and  $1.1 \times 10^{16} \text{ ion/cm}^2$  in section A.

8. Claims 1 and 3-5 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Amaral et al., "Very Thin Fe/Ni modulation multilayer Films Under Ion Bombardment", J. Appl. Phys., Vol. 81(8) pp. 4773-4775 (04/1997).

The irradiation with multilayered Fe/Ni films with 14 keV He, 70 keV Ne and 400 keV Xe at dosages of  $10^{16}$  to  $10^{17}$  are disclosed as causing mixing. See figure 16.

9. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steckl et al. "Review of Focused ion beam mixing for the fabrication of GaAs based optoelectronic devices", J. Vac. Sci. Technol. B, Vol 13(6) pp 2570-2575 (11/12-1995).

Art Unit: 1756

It would have been obvious to use resist or mask to pattern a wider ion beam in place of the focused ion beam in the process exemplified based upon their disclosed equivalence.

10. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amaral et al., "Very Thin Fe/Ni modulation multilayer Films Under Ion Bombardment", J. Appl. Phys., Vol. 81(8) pp. 4773-4775 (04/1997), in view of Steckl et al. "Review of Focused ion beam mixing for the fabrication of GaAs based optoelectronic devices", J. Vac. Sci. Technol. B, Vol 13(6) pp 2570-2575 (11/12-1995)

It would have been obvious to use resist or mask to pattern a wide ion beam in place of any focused ion beam in the process exemplified by Amaral et al., "Very Thin Fe/Ni modulation multilayer Films Under Ion Bombardment", J. Appl. Phys., Vol. 81(8) pp. 4773-4775 (04/1997) based upon their disclosed equivalence within the art by Steckl et al. "Review of Focused ion beam mixing for the fabrication of GaAs based optoelectronic devices", J. Vac. Sci. Technol. B, Vol 13(6) pp 2570-2575 (11/12-1995).

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Gamo et al., "Recent advances in the Application of focused ion beams", Mat. Res. Soc. Symp. Proc., Vol. 45 pp. 223-234 (1985) in table 1 indicates that mixing in layers a few nm thick requires from  $10^{15}$  to  $10^{16}$  ions/cm<sup>2</sup>.

Imura et al. '488 (4/42+), Nagasawa et al. '908 (7/10+) and JP 62-297458 teach ion mixing of layers.

Art Unit: 1756

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebranndt whose telephone number is 703-308-4397. The examiner can normally be reached on Mondays-Thursday and alternative Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



Martin J Angebranndt  
Primary Examiner  
Art Unit 1756

November 15, 2001